

What is claimed is:

1. An improved mast for a fork lift comprising:

a) a carriage assembly comprising a first upper roller, a first lower roller, a second upper roller, a second lower roller and a front surface;

b) a first rail section comprising a first rail and a second rail positioned substantially parallel to each other, the first rail and second rail each comprising a back inner surface, a lateral inner surface and a front inner surface that are capable of operatively guiding said carriage assembly along a portion of the length of the rail section;

wherein the angle between said first upper roller and said front surface is greater than about 90.5° .

2. An improved mast for a fork lift as claimed in claim 1, wherein the angle between said second upper roller and said front surface is greater than about 90.5° .

3. An improved mast for a fork lift as claimed in claim 1, wherein the angle between said front inner surface of said first rail and said lateral inner surface is greater than about 90.5° .

4. An improved mast for a fork lift as claimed in claim 1, wherein the angle between said front inner surface of said second rail and said lateral inner surface is greater than about 90.5°.

5 5. An improved mast for a fork lift as claimed in claim 1, wherein the angle between said first upper roller and said front surface is in the range of about 92.5° to about 93.5°.

6. An improved mast for a fork lift as claimed in claim 1, wherein the angle between said second upper roller and said front surface is in the range of about 92.5° to about 93.5°.

7. An improved mast for a fork lift as claimed in claim 1, wherein the angle between said front inner surface of said first rail and said lateral inner surface is in the range of about 91.5° to about 92.5°.

8. An improved mast for a fork lift as claimed in claim 1, wherein the angle between said front inner surface of said second rail and said lateral inner surface is in the range of about 91.5° to about 92.5°.

9. An improved mast for a fork lift as claimed in claim 1, wherein the angle between said first upper roller and said front surface is about 93.0° .

10. An improved mast for a fork lift as claimed in claim 1, wherein the angle
5 between said second upper roller and said front surface is about 93.0° .

11. An improved mast for a fork lift as claimed in claim 1, wherein the angle between said front inner surface of said first rail and said lateral inner surface is about 92.0° .

12. An improved mast for a fork lift as claimed in claim 1, wherein the angle between said front inner surface of said second rail and said lateral inner surface is about 92.0° .

13. An improved mast for a fork lift as claimed in claim 1, wherein a portion of the width of said first rail section is reduced.

14. An improved mast for a fork lift as claimed in claim 1, further comprising a second rail section comprising a first rail and a second rail positioned substantially
20 parallel to each other and a cross member;

wherein the first rail section is operative connected to the second rail section to allow the first rail section to telescope inside the second rail section and out from the second rail section;

5 wherein a portion of the width of said first rail section is reduced that is near said cross member when the first rail section is telescoped inside the second rail section.

15. An improved mast for a fork lift comprising a carriage assembly having a first upper roller, a first lower roller, a second upper roller and a second lower roller;

wherein at least one of said first upper roller, said first lower roller, said second upper roller, and said second lower roller is canted.

16. An improved mast for a fork lift comprising:

- a) a carriage assembly comprising a first upper roller, a first lower roller, a second upper roller, a second lower roller and a front surface;
- b) a first rail section comprising a first rail and a second rail positioned substantially parallel to each other, the first rail and second rail each comprising a back inner surface, a lateral inner surface and a front inner surface that are capable of operatively guiding said carriage assembly along a portion of the length of the rail section;

wherein the angle between said front inner surface of said first rail and said lateral inner surface is greater than about 90.5°.

17. An improved mast for a fork lift as claimed in claim 16, wherein the angle
5 between said first upper roller and said front surface is greater than about 90.5°.

18. An improved mast for a fork lift as claimed in claim 16, wherein the angle between said second upper roller and said front surface is greater than about 90.5°.

19. An improved mast for a fork lift as claimed in claim 16, wherein the angle between said front inner surface of said second rail and said lateral inner surface is greater than about 90.5°.

20. An improved mast for a fork lift as claimed in claim 16, wherein the angle between said first upper roller and said front surface is in the range of about 92.5° to about 93.5°.

21. An improved mast for a fork lift as claimed in claim 16, wherein the angle between said second upper roller and said front surface is in the range of about 92.5° to
20 about 93.5°.

22. An improved mast for a fork lift as claimed in claim 16, wherein the angle between said front inner surface of said first rail and said lateral inner surface is in the range of about 91.5° to about 92.5° .

5 23. An improved mast for a fork lift as claimed in claim 16, wherein the angle between said front inner surface of said second rail and said lateral inner surface is in the range of about 91.5° to about 92.5° .

24. An improved mast for a fork lift as claimed in claim 16, wherein the angle between said first upper roller and said front surface is about 93.0° .

25. An improved mast for a fork lift as claimed in claim 16, wherein the angle between said second upper roller and said front surface is about 93.0° .

15 26. An improved mast for a fork lift as claimed in claim 16, wherein the angle between said front inner surface of said first rail and said lateral inner surface is about 92.0° .

20 27. An improved mast for a fork lift as claimed in claim 16, wherein the angle between said front inner surface of said second rail and said lateral inner surface is about 92.0° .

28. An improved mast for a fork lift as claimed in claim 16, wherein a portion of the width of said first rail section is reduced.

5 29. An improved mast for a fork lift as claimed in claim 16, further comprising a second rail section comprising a first rail and a second rail positioned substantially parallel to each other and a cross member;

wherein the first rail section is operative connected to the second rail section to allow the first rail section to telescope inside the second rail section and out from the second rail section;

wherein a portion of the width of said first rail section is reduced that is near said cross member when the first rail section is telescoped inside the second rail section.

30. An improved mast for a fork lift comprising a carriage assembly having a first upper roller, a first lower roller, a second upper roller, a second lower roller and a front surface;

wherein at least one of said first upper roller, said first lower roller, said second upper roller, and said second lower roller is angled relative to said front surface.

20 31. An improved mast for a fork lift comprising a rail section that includes a first rail and a second rail positioned substantially parallel to each other, the first rail and

second rail each comprising a back inner surface, a lateral inner surface and a front inner surface;

wherein the front inner surface of said first rail and said second rail are angled relative to said lateral inner surface.

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32. An improved mast for a fork lift as claimed in claim 1, wherein the back inner surface of said first rail and said second rail is substantially straight.

33. An improved mast for a fork lift comprising:

a carriage assembly comprising a first upper roller, a first lower roller, a second upper roller, a second lower roller and a front surface;

an inner rail section comprising a first rail and a second rail positioned substantially parallel to each other, the first rail and second rail each comprising a back inner surface, a lateral inner surface and a front inner surface that are capable of operatively guiding said carriage assembly along at least a portion of the length of said inner rail section;

a middle section comprising a first rail and a second rail positioned substantially parallel to each other, wherein said inner rail section is operative connected to said middle rail section to allow the inner rail section to telescope inside said middle rail section and out from said middle rail section;

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an outer rail section comprising a first rail and a second rail positioned substantially parallel to each other; wherein said middle rail section is operative connected to said outer rail section to allow the middle rail section to telescope inside said outer rail section and out from said outer rail section;

5 wherein the first upper roller and second upper roller on said carriage assembly are positioned relative to said front surface at an angle greater than about 90.5°;

wherein the front inner surface of said first rail and said second rail of said inner rail section are positioned relative said front surface at an angle about 90.0°.

34. An improved mast for a fork lift comprising:

a first rail, wherein said first rail comprises a first inner surface including a first back inner surface, a first front inner surface substantially opposite said first back inner surface, a first lateral inner surface that connects said first back inner surface and said first front inner surface;

a second rail positioned substantially parallel to said first rail, wherein said second rail comprises a second inner surface including a second back inner surface, a second front inner surface substantially opposite said second back inner surface, and a second lateral inner surface that connects said second back inner surface and said second front inner surface;

a carriage assembly comprising a first upper roller, a second upper roller positioned substantially opposite said first upper roller, a first lower roller, a second lower roller positioned substantially opposite said first lower roller, and a front surface;

wherein said first upper roller and said first lower roller of said carriage assembly are operatively guided by said first inner surface of said first rail, and said second upper roller and said second lower roller of said carriage assembly are operatively guided by said second inner surface of said second rail, to cause said front surface of said carriage assembly to move along at least a portion of the length said first rail and said second rail;

wherein the intersection of said first front surface and said first lateral surface forms a first angle between said first front surface and said first lateral surface.

wherein said first angle is greater than about 90.5° .

35. The improved mast of claim 34, wherein said first angle is in the range of about 91.5° to about 92.5° .

36. The improved mast of claim 34, wherein said first angle is about 92.0° .

37. The improved mast of claim 34, wherein the axis of rotation of said first upper roller is not substantially parallel to said front surface of said carriage assembly.

38. The improved mast of claim 34, wherein the rotation of said first upper roller defines a first plane;

wherein the intersection of said front surface of said carriage assembly and said first plane forms a second angle between said first front surface of said carriage assembly and said first plane;

wherein said second angle is greater than about 90.5°.

39. The improved mast of claim 38, wherein said second angle is in the range of about 92.5° to about 93.5°.

40. The improved mast of claim 38, wherein said second angle is about 93.0°.

41. An improved mast for a fork lift comprising:

a first rail, wherein said first rail comprises a first inner surface including a first back inner surface, a first front inner surface substantially opposite said first back inner surface, a first lateral inner surface that connects said first back inner surface and said first front inner surface;

a second rail positioned substantially parallel to said first rail, wherein said second rail comprises a second inner surface including a second back inner surface, a second front inner surface substantially opposite said second back inner surface, and a second

lateral inner surface that connects said second back inner surface and said second front inner surface;

10 a carriage assembly comprising a first upper roller, a second upper roller positioned substantially opposite said first upper roller, a first lower roller, a second lower roller positioned substantially opposite said first lower roller, and a front surface;

15 wherein said first upper roller and said first lower roller of said carriage assembly are operatively guided by said first inner surface of said first rail, and said second upper roller and said second lower roller of said carriage assembly are operatively guided by said second inner surface of said second rail, to cause said front surface of said carriage assembly to move along at least a portion of the length said first rail and said second rail;

20 wherein the intersection of said first front surface and said first lateral surface forms a first angle between said first front surface and said first lateral surface.

wherein the rotation of said first upper roller defines a first plane;

25 wherein the intersection of said front surface of said carriage assembly and said first plane forms a second angle between said first front surface of said carriage assembly and said first plane;

wherein the relative difference between said first angle and said second angle is greater than about 0.5°.

20 42. An improved mast as claimed in claim 41, wherein the relative difference between said first angle and said second angle is in the range of about 0.5° to about 3.0°.

43. An improved mast as claimed in claim 41, wherein the relative difference between said first angle and said second angle is about 1.0° .

5 44. An improved mast for a fork lift comprising:

a first rail, wherein said first rail comprises a first inner surface including a first back inner surface, a first front inner surface substantially opposite said first back inner surface, a first lateral inner surface that connects said first back inner surface and said first front inner surface;

a second rail positioned substantially parallel to said first rail, wherein said second rail comprises a second inner surface including a second back inner surface, a second front inner surface substantially opposite said second back inner surface, and a second lateral inner surface that connects said second back inner surface and said second front inner surface;

15 a carriage assembly comprising a first upper roller, a second upper roller positioned substantially opposite said first upper roller, a first lower roller, a second lower roller positioned substantially opposite said first lower roller, and a front surface;

20 wherein said first upper roller and said first lower roller of said carriage assembly are operatively guided by said first inner surface of said first rail, and said second upper roller and said second lower roller of said carriage assembly are operatively guided by

said second inner surface of said second rail, to cause said front surface of said carriage assembly to move along at least a portion of the length said first rail and said second rail;

wherein the rotation of said first upper roller defines a first plane;

wherein the intersection of said front surface of said carriage assembly and said

5 first plane forms a second angle between said first front surface of said carriage assembly and said first plane;

wherein said second angle is greater than about 90.5° .

45. The improved mast of claim 44, wherein said second angle is in the range of about 92.5° to about 93.5° .

46. The improved mast of claim 44, wherein said second angle is about 93.0° .